FINAL REPORT

Feasibility Study

Northeastern Gravure Cylinder Service Site Moreau, New York

New York State Department of Environmental Conservation

May 2007

O'BRIEN & GERE

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TABLE OF CONTENTS

List of Tables

List of Figures

1. Introduction

1.1 Purpose

The purpose of this report is to present the Feasibility Study (FS) for the Northeastern Gravure Cylinder Service (NEGC) property, identified as Site No. 5-46-029 on the New York State Registry of Inactive Hazardous Waste Sites. The Site is located in the Town of Moreau, Saratoga County, New York. A site location map is provided as Figure 1.

This FS was conducted on behalf of the New York State Department of Environmental Conservation (NYSDEC) in accordance with:

- the provisions of CERCLA as amended by SARA
- the National Oil and Hazardous Substances Pollution Contingency Plan (NCP; Federal Register 1990)
- the NYSDEC Division of Environmental Remediation *Technical Guidance for Site Investigation and Remediation* (Division of Environmental Remediation (DER)-10; NYSDEC 2002)
- the United Stated Environmental Protection Agency (USEPA) *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (USEPA 1988)
- the NYSDEC revised *Technical Administrative Guidance Memorandum (TAGM) on Selection of Remedial Actions at Inactive Hazardous Waste Sites* (NYSDEC 1990)
- the Remedial Investigation/Feasibility Study – Final Project Management Work Plan (PMWP; O'Brien & Gere 2004).

1.2. Site Background

The NEGC site is a former industrial facility used for copper plating and engraving of printing cylinders used in the Gravure printing process. The Site consists of a 1.9 acre property bordered to the northeast by Drywall Center Inc. (the Tierny property), to the southwest by Moore's Lumber and Building Supply and Citgo gas station and mini-mart, and to the southeast by the Sun Haven Motel. The Town of Moreau Landfill is located approximately 1,500 feet to the north of the NEGC Site, on the north side of Butler Road.

As described in the Remedial Investigation (RI) Report (O'Brien & Gere 2007), printing operations at the facility between 1981 and 1989 involved copper plating followed by etching. In 1989 copper plating was replaced by nickel plating. In addition to the copper and nickel plating, chromium plating was also conducted at the facility. Over the years of operation, industrial rinseate containing hexavalent chromium, trivalent chromium and copper was discharged to two 2000-gallon concrete underground storage tanks (USTs) located in the southwestern corner of the property behind the building. The NYSDEC found these tanks overflowing and leaking during an inspection in September 1985. Based on this observation, NYSDEC classified the NEGC Site as a Class 2 Inactive Hazardous Waste Disposal Site (No. 5-46-029).

As described in the RI Report, various investigations were performed between October 1985 and October 2000. These investigations revealed the presence of metal constituents including hexavalent chromium in the soil within the tank overflow spill area, which is estimated to encompass an area of approximately 2,200 square ft. Facility drawings indicated that three leach fields existed in the rear of the NEGC building. Metal contaminants were detected within the leach field areas. Chromium, hexavalent chromium and copper concentrations in excess the respective Class GA standards for ground water were also detected in ground water monitoring wells.

1.3. Summary of Remedial Investigation

In January 2005, ground water was sampled to obtain a current data set to be used to develop the scope of the RI. The RI was conducted at the Site by O'Brien & Gere Engineers, Inc. on behalf of NYSDEC from April 2006 through July 2006. The RI is summarized in the Remedial Investigation Report (O'Brien & Gere 2007).

Environmental samples were collected from the following media:

- ground water
- surface water
- subsurface soil
- surface soil.

Additionally, samples were collected from test pit soil, a water sample from one of the two 2,000 gallon industrial rinseate UST, and a potable water sample from the adjacent Tierny property office building. Sample locations are shown on Figure 2 and Figure 3.

Ground water samples were collected from the twelve existing monitoring wells at the Site, from two existing monitoring wells at the Moreau Landfill and from four newly installed monitoring wells from May 16 through May 23, 2006. Three additional surface water samples were collected in May 2006. Subsurface soil samples were obtained from three soil borings at 4-ft intervals to a depth of approximately 35 ft bgs. Thirty surface soil samples were collected from within 2 inches of the surface.

The May 2006 ground water, potable water, and UST water samples, test pit soil, subsurface soil and surface soil samples were analyzed for metals. Detected metal contaminants of concern (COCs) are summarized below.

Inorganic constituents were detected in surface water from sampling location S-1 during the January 2005 sampling event and sampling locations S-3 and S-4 in the May 2006 sampling event, however, these concentrations did not exceed the NYSDEC TOGs 1.1.1, Class C surface water standards.

The COCs detected in test pit soil, surface soil and subsurface soil at the NEGC site were chromium, hexavalent chromium and copper. The subsurface soil samples were obtained from soil borings installed in the vicinity of potential source areas, which included the historic spill area, the area around MW-4S and the leach fields. The highest concentrations of the COCs were detected in the subsurface soil sample collected from TP-2W, TP-3 and the GP-2 location. In surface soil, the highest detected COC concentrations were detected at five locations which included two samples in the historic spill area, one sample outside of the NEGC building doorway and two samples adjacent to soil and concrete mounds.

During the May 2006 sampling event, the detected chromium and hexavalent chromium concentrations in shallow unconsolidated unit ground water samples exceeded the Class GA ground water standard of 0.05 micrograms per liter (mg/L) at HC-101S, HC-103, and MW-8S. The detected copper concentrations in shallow unconsolidated unit ground water samples exceeded the Class GA ground water standard of 0.2 mg/L at MW-6. Detected chromium, hexavalent chromium and copper concentrations in the deep unconsolidated unit ground water samples exceeded the Class GA ground water standards at EHC-2D. However, the EHC-2D sample results are considered anomalous and not representative of the deep unconsolidated unit ground water due to elevated turbidity readings.

1.4. Human Health Risk Assessment

As part of the RI, a qualitative exposure pathway analysis was performed for the Site to evaluate the potential for human exposure to site constituents. Following is a summary of the potentially complete current and future onsite exposure pathways:

- Ingestion of surface soil by adult, adolescent and child trespasser
- Inhalation of fugitive dust from surface soil by adult, adolescent and child trespasser
- Ingestion of surface soil by adult construction worker
- Inhalation of fugitive dust and ingestion of subsurface soil from open trenches/excavations by adult construction worker.

There were no potentially complete current or future off-site exposure pathways identified.

A survey of surrounding properties within a ¼ mile radius of the Site was conducted. The Town of Moreau billing records were used to identify properties that are connected to public water. Based upon a survey of non-vacant properties that are not connected to public water, one property, Lamplighter Acres, a manufactured housing property, is using a private well as a potable water source. This property is located approximately 500 ft to the west of the Site.

1.5. RI Conclusions

The following are the conclusions of the RI, as described in the RI report:

- The geology in the study area consists of unconsolidated deposits of glacial origin, reaching an observed thickness of 130 ft, which overly bedrock of the Snake Hill Formation throughout the site.
- The direction of ground water flow is predominantly and consistently to the north. The ground water velocity within the shallow unconsolidated aquifer is estimated to be approximately 3.2 ft/day (1168 ft/year). The ground water velocity within the deep unconsolidated unit is estimated to be approximately 0.3 ft/day (110ft/year).
- The soil analytical data indicate that releases of plating wastes have impacted soil on the NEGC Site. Analytical data within the shallow unconsolidated unit indicate that ground water has been impacted by chromium, copper and hexavalent chromium. The COCs have migrated laterally to the north approximately 450 feet from the NEGC Site. The NEGC property is likely the source of chromium, copper and hexavalent chromium detected at downgradient locations at the adjacent Tierny property.
- Potentially complete exposure pathways include current and future potential inhalation or ingestion of onsite surface and/or subsurface soil for trespassers or construction workers. The offsite soil exposure pathway is incomplete. The current and future, onsite and offsite, potential ground water exposure pathways are incomplete.
- While the presence of COCs in surface and subsurface soil has been identified, additional characterization would be necessary to delineate the horizontal and vertical extent of contamination in soil and to locate and evaluate potential soil contamination associated with the third leach field. These data gaps do not preclude the development and evaluation of remedial alternatives. The characterization/delineation data, described above, would be collected during the pre-design effort.

2. Development of Remedial Alternatives

The objective of this phase of the FS was to develop a range of remedial alternatives for the Site. The process for the development of alternatives consisted of six steps:

- identification of potential standards, criteria and guidance (SCGs)
- development of remedial action objectives (RAOs)
- identification of general response actions
- identification of areas or volumes of media
- identification, screening, and evaluation of remedial technologies and process options
- assembly of remedial alternatives.

NYSDEC's DER-10 draft guidance entitled *Technical Guidance or Site Investigation and Remediation,* (NYSDEC 2002) and the NYSDEC's DER-15 draft guidance entitled *Presumptive/Proven Remedial Technologies,* (NYSDEC 2006) were considered during the development of remedial alternatives.

2.1. Identification of Potential Standards, Criteria and Guidance

There are three types of SCGs: chemical-, location-, and action-specific SCGs. Chemical-specific SCGs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to the ambient environment. Location-specific SCGs set restrictions on activities based on the characteristics of the site or immediate environs. Action-specific SCGs set controls or restrictions on particular types of remedial actions once the remedial actions have been identified as part of a remedial alternative. The identification of potential chemical- and action- specific SCGs is documented in Table 1; there were no location-specific SCGs identification for the Site.

2.2. Development of Remedial Action Objectives

RAOs are medium-specific goals for protecting human health and the environment. These RAOs form the basis for the FS by providing overall goals for site remediation. The RAOs are considered during the identification of appropriate remedial technologies and formulation of alternatives for the site, and later during the evaluation of remedial alternatives.

RAOs are based on risk-based information established in the risk assessment, and potentially applicable or relevant and appropriate SCGs. Documentation of the rationale employed in the development of the RAOs for the Site is presented in the following sections.

2.2.1 Remedial Action Objectives for Soil

Soil concentrations were compared 6 NYCRR Part 375-6 "Restricted Use Soil Cleanup Objectives-Residential" screening values during the evaluation of the nature and extent of contaminated soil onsite. Trivalent and hexavalent chromium and copper were identified as COCs based on comparison 6 NYCRR Part 375 soil cleanup objectives with consideration of Eastern United States background concentrations.

A potentially complete pathway exists for ingestion of soil and inhalation of fugitive dust by adult, adolescent and child trespassers and adult construction workers at the Site. Accordingly, the RAOs developed for the Site soil consists of:

- Prevent ingestion of contaminated soil onsite.
- Prevent inhalation of onsite fugitive dust.
- Prevent migration of COCs that would result in ground water contamination.

2.2.2 Remedial Action Objectives for Ground Water

Analytical results indicate the presence of site-related COCs in samples collected from both onsite and offsite ground water monitoring wells. The NYS Class GA ground water standards were identified as a potential SCG. Exceedances of the NYS Class GA ground water standards for site related COCs were observed both onsite and offsite. It is also noted that the Town of Moreau provides a water supply for potable water use.

As documented in the RI Report, no complete exposure pathways were identified for ground water.

Accordingly, the RAOs identified for ground water consist of:

- Prevent ingestion of ground water with COC concentrations exceeding Class GA standards
- Restore ground water to pre-disposal/pre-release conditions, to the extent practicable.

2.3. Identification of Areas and Volumes of Media

Site conditions, the nature and extent of contamination, and preliminary remediation goals were taken into consideration to estimate the volumes and areas of media to be addressed by the general response actions.

The Site occupies a parcel of property with an area of approximately 1.9 acres. The full extent of COC contamination in soil has not been determined. However, based upon the information presented in the RI Report, it was estimated that approximately 500 cubic yards (750 tons) of contaminated soil is present at the Site. The surface area of potentially impacted soil was assumed to be approximately 0.56 acres. As part of pre-design activities, a delineation of the extent of soil contamination is recommended.

Ground water is present at the site over the entire areal extent of the parcel. The full extent of contamination in ground water has not been identified. However, based upon the data presented in the RI Report, it was assumed for the purposes of the FS that the contaminated ground water extends from the site to approximately 450 ft north, approximately 60 ft beyond monitoring well MW-8S.

2.4. Identification of General Response Actions

General response actions are medium-specific actions that may be combined into alternatives to satisfy the RAOs. General response actions that address the RAOs related to the Site media include institutional controls, containment, removal, disposal, reuse, and treatment. General response actions applicable to the Site are included in Table 2.

2.5. Identification and Screening of Remedial Technologies and Process Options

Potentially applicable remedial technology types and process options for each general response action were identified during this step. Process options were screened on the basis of technical implementability. The technical implementability of each identified process option was evaluated with respect to site contaminant information, site physical characteristics, and areas and volumes of affected media.

Descriptions and screening comments for technologies and process options identified for the Site are presented in Table 2. Process options that were viewed as not implementable for the site were not considered further in the FS. Following are descriptions of technologies that were considered potentially implementable for the Site.

2.5.1. Soil

No action. The no action general response action must be considered in the FS, as specified in the NCP (40 CFR Part 300.430).

Institutional control actions. The remedial technology associated with the institutional control general response action that was identified for the Site was access restrictions. Access restrictions identified consist of environmental easements. The process option considered potentially applicable is described as follows.

- **Environmental easements.** With respect to contaminated soil, land use restrictions would be reflected in the property deed. The environmental easement would preclude activities that could result in unacceptable exposure to contaminated soil, without prior review and approval by NYSDEC.

Containment actions. The remedial technology associated with the containment general response action that was identified for the Site was capping. The process option considered potentially applicable is described below.

- **Low-permeability cover.** A low permeability cover would have the components of a soil cover, however additional layers of low permeability material (i.e., low permeable soils or geocomposites) would be incorporated to minimize infiltration.

Ex Situ Treatment Action. The remedial technology associated with the *ex situ* treatment general response action that was identified for the Site was physical treatment. The process option considered potentially applicable is described below.

- **Solidification/stabilization.** Contaminated soil would be bound into a less mobile solidified matrix.

Removal Action. The remedial technology associated with the removal general response action that was identified for the Site was excavation. The process option considered potentially applicable is described below.

- **Excavation.** Construction equipment, such as backhoes or bulldozers would be used to remove contaminated soil and the UST.

Disposal Action. The remedial technology associated with the disposal general response action that was identified for the Site was land disposal. The process option considered potentially applicable is described below

- **Offsite commercial landfill.** Excavated soil and concrete would be transported offsite and disposed of at a commercial landfill.

2.5.2. Ground Water

No action. The no action general response action must be considered in the FS, as specified in the NCP (40 CFR Part 300.430).

Institutional control actions. The remedial technologies associated with the institutional control general response action that was identified for the Site were monitoring and access restrictions. Access restrictions identified consist of ground water use restrictions. The process options considered potentially applicable are described as follows.

- **Ground water monitoring.** Ground water monitoring would involve periodic sampling and analysis of ground water onsite and offsite. Ground water monitoring would provide a means to detect changes in constituent concentrations in the ground water.

- **Ground water use restrictions.** Currently, ground water at the site is not used as a potable water source. Ground water use restrictions would include an environmental easement that would preclude the use of ground water at the site without prior notification and approval from NYSDEC.

Collection actions. The remedial technology that was identified for the Site related to the collection general response action for ground water was ground water extraction. The ground water extraction process options considered applicable were recovery wells.

- **Recovery wells.** Contaminated ground water would be collected by pumping from recovery wells. A pumping test performed on the site would be required to identify locations to place the extraction wells and evaluate appropriate pumping rates and/or levels to minimize migration of contaminated ground water from the source areas.

Ex situ treatment actions. The remedial technologies that were identified for the Site, related to the *ex situ* treatment general response action for ground water, were physical and chemical treatment. The ground water extraction process options considered applicable are described below.

- **Precipitation.** Precipitation is a chemical treatment technology which alters the pH of ground water in order to separate contaminants from the water particles. This technology would effectively remove site-related inorganic constituents from the ground water stream. The precipitate residue would require further management.

- **Ion exchange.** Ion exchange is a chemical treatment technology for ground water. Contaminants, particularly heavy metals, would be removed by passing ground water through a resin media that exchanges sorbed ions for dissolved contaminants. The exchange resin would be regenerated by back-flushing with a regeneration solution.

Discharge actions. The discharge process options considered applicable are presented below:

- **Discharge to surface water (storm sewer).** Extracted and/or treated ground water would be discharged to the storm sewer pursuant to a State Pollutant Discharge Elimination System (SPDES) permit.

- **Discharge to POTW.** Extracted and/or treated ground water would be released to municipal sanitary sewers, ultimately treated and discharged by a municipal treatment plant.

2.6. Evaluation of Remedial Technologies

The process options remaining after the initial screening were evaluated further according to the criteria of effectiveness, implementability, and cost. The effectiveness criterion included the evaluation of: potential effectiveness of the process options in meeting remedial objectives and handling the estimated volumes or areas of media; potential effects on human health and the environment during construction and implementation; and experience and reliability of the process options for site contaminants and conditions. Technical and institutional aspects of implementing the process options were assessed for the implementability criterion. The capital and operation and maintenance (O&M) costs of each process option were evaluated as to whether they were high, medium, or low relative to the other process options of the same technology type.

Based on the evaluation, the more favorable process options of each technology type were chosen as representative process options. The selection of representative process options simplifies the assembly and evaluation of alternatives, but does not eliminate other process options. The process option actually used to implement remediation may not be selected until the remedial design phase. A summary of the evaluation of process options and selected representative process options is presented in Table 3.

2.7. Assembly of Remedial Alternatives

Remedial alternatives were developed by assembling general response actions and representative process options into combinations that address the Site. Four alternatives were developed for the Site. A summary of the alternatives and their components is presented in Table 4. A description of each alternative is included in the following subsections.

2.7.1. Common Components of Alternatives

Environmental easements and a Site Management Plan, which would include ground water monitoring and periodic reviews, are common elements to each of the alternatives being evaluated for the Site. A description of these elements is included below.

Environmental Easement. An institutional control, in the form of an environmental easement, would consist of land use restrictions and ground water use restrictions. Land use restrictions would restrict activities that could result in unacceptable exposure to contaminated soil. Ground water use restrictions would preclude the use of ground water at the site without prior notification and approval from NYSDEC. Restrictions related to soil and ground water would be implemented on the Site property.

Site Management Plan. Since impacted soil or ground water would remain onsite or offsite, each alternative would require periodic site management reviews as part of a Site Management Plan. The periodic reviews would focus on evaluating the onsite and offsite conditions with regard to the continuing protection of human health and the environment with information provided by ground water monitoring results and documentation of field inspections. Ground water monitoring would be implemented to track COC concentrations in ground water both onsite and offsite and would be instrumental in detecting changes in concentrations. Ground water monitoring would consist of quarterly sampling of 18 wells with analysis of chromium, hexavalent chromium and copper over a period of 30 years, for Alternatives 1 and 2, and 5 years, for Alternatives 3 and 4.

2.7.2. Alternative 1

Alternative 1 is the no action alternative. The no action alternative is required by the NCP and serves as a benchmark for the evaluation of action alternatives.

2.7.3. Alternative 2

Alternative 2 consists of capping, an environmental easement and a Site Management Plan. In addition to the components presented in Section 2.7.1, this alternative would involve the following process options:

Cap. A cover would consist of the following minimum components (listed from the finished grade down): 6 inches topsoil, 24 inches soil material as a barrier protection layer, tri-planar geonet, 40 mil linear low density polyethylene, 6 inches soil bedding layer. The objective of the cap would be to minimize infiltration of precipitation that may cause leaching of COCs from site soil to ground water. For cost estimation purposes, the cap was assumed to be approximately 0.56 acres in extent.

2.7.4. Alternative 3

Alternative 3 consists of source material excavation with offsite disposal, an environmental easement and a Site Management Plan. This alternative would involve the following process options in addition to those presented in Section 2.7.1.

Source material excavation. Following confirmation of the extent of soil contamination during pre-design activities, soil, the former USTs and associated sludge would be removed and disposed off-site. The approximate soil excavation area is shown in Figure 4. For cost estimation purposes, a volume of 500 cubic yards was assumed. Excavation would be conducted using conventional construction equipment. Excavated material would be transported to a proper disposal site. It is assumed that most of the material would be non-hazardous. For cost estimation purposes, 10 cubic yards of material was assumed to be hazardous waste, and thus require transportation and disposal as such. Following excavation, clean backfill and topsoil would be deposited onsite, graded and seeded for restoration.

2.7.5. Alternative 4

Alternative 4 consists of the following: source material excavation with offsite disposal; ground water extraction, treatment and discharge; an environmental easement and a Site Management Plan. This alternative would involve the following process options in addition to those presented in Section 2.7.1.

Source material excavation. Following confirmation of the extent of soil contamination during pre-design activities, soil, the former USTs and associated sludge would be removed and disposed off-site. The approximate soil excavation area is shown in Figure 4. For cost estimation purposes, a volume of 500 cubic yards was assumed. Excavation would be conducted using conventional construction equipment. Excavated material would be transported to a proper disposal site. It is assumed that most of the material would be non-hazardous. For cost estimation purposes, 10 cubic yards of material was assumed to be hazardous waste, and thus require transportation and disposal as such. Following excavation, clean backfill and topsoil would be deposited onsite, graded and seeded for restoration.

Onsite ground water extraction. A ground water extraction system was assumed to consist of three 80-ft deep extraction wells to collect ground water. The flowrate was assumed to be approximately 25 gallons per minute (gpm) per well. For purposes of the FS, an approximate production rate of 75 gpm was assumed for collection of onsite ground water. It was anticipated that extracted ground water would be treated using precipitation to treat hexavalent chromium, trivalent chromium and copper in ground water. Specifically the treatment train was anticipated to consist of hexavalent chromium reduction, precipitation, liquid solids separation, solids management, and effluent pH conditioning. Treated ground water would be discharged to the storm sewer. A remediation duration of 1 to 5 years was estimated based upon the assumptions that the source would be removed and that the existing aquifer geochemical conditions are such that contaminants would remain in solution during flushing. Also, for cost estimation purposes, a treatability study was assumed to be necessary as a pre-design activity.

3. Detailed Analysis of Alternatives

The following section documents the detailed evaluation of the alternatives developed for the site. The objective of the detailed analysis of alternatives was to analyze and present sufficient information to allow the alternatives to be compared and a remedy selected. The analysis consisted of an individual assessment of each alternative with respect to eight evaluation criteria that encompass statutory requirements and overall feasibility and acceptability. The detailed evaluation of alternatives also included a comparative evaluation designed to consider the relative performance of the alternatives and identify major trade-offs among them. The eight evaluation criteria are:

- Overall protectiveness of human health and the environment
- Compliance with SCGs
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost
- Community acceptance

The preamble to the NCP (Federal Register 1990) indicates that, during remedy selection, these nine criteria should be categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The two threshold criteria, overall protection of human health and the environment, and compliance with SCGs, must be satisfied in order for an alternative to be eligible for selection. Long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implemetability; and cost were primary balancing criteria that were used to balance the trade-offs between alternatives. The modifying criterion is community acceptance, which will be formally considered after public comment is received on the Proposed Remedial Action Plan. The New York State TAGM entitled *Selection of Remedial Actions at Inactive Hazardous Waste Sites*, (NYSDEC 1990) and NYSDEC's DER-10 draft guidance entitled *Technical Guidance or Site Investigation and Remediation,* (NYSDEC 2002) were also considered during this evaluation.

3.1. Individual Analysis of Alternatives

In the individual analysis of alternatives, each of the remedial alternatives was evaluated with respect to the evaluation criteria. A summary of the individual analysis of alternatives is presented in Table 5.

3.1.1. Overall Protection of Human Health and the Environment

The analysis of each alternative with respect to this criterion provides an evaluation of whether the alternative achieves and maintains adequate protection and a description of how site risks are eliminated, reduced, or controlled through treatment, engineering, or institutional controls. The individual analysis of each remedial alternative with respect to this criterion is presented in Table 5.

3.1.2. Compliance with Standards, Criteria and Guidance

Potential SCGs for the Site are presented in Table 1 and the individual analysis of each remedial alternative with respect to this criterion is presented in Table 5.

3.1.3. Long-Term Effectiveness and Permanence

This criterion assesses the magnitude of residual risk remaining from untreated material or treatment residuals at the site. The adequacy and reliability of controls used to manage untreated material or treatment residuals are also evaluated. The individual analysis of each remedial alternative with respect to this criterion is presented in Table 5.

3.1.4. Reduction of Toxicity, Mobility, or Volume through Treatment

The evaluation of this criterion addressed the expected performance of treatment technologies in each alternative. The individual analysis of each remedial alternative with respect to this criterion is presented in Table 5.

3.1.5. Short-Term Effectiveness

The evaluation of short-term effectiveness addressed the protection of workers and the community during construction and implementation of each alternative, and potential environmental effects resulting from implementation of each alternative. The time required to achieve remedial objectives was also evaluated under this criterion. The individual analysis of each remedial alternative with respect to this criterion is presented in Table 5.

3.1.6. Implementability

The analysis of implementability involved an assessment of the ability to construct and operate the technologies, the reliability of the technologies, the ease of undertaking additional remedial action, the ability to monitor the effectiveness of each remedy, and the ability to obtain necessary approvals from other agencies. Additionally, the availability of services, capacities, equipment, materials, and specialists necessary for implementation of the alternative was also assessed. The individual analysis of each remedial alternative with respect to this criterion is presented in Table 5.

3.1.7. Cost

For the cost analysis, cost estimates were prepared for each alternative based on vendor information and quotations, cost estimating guides, and experience. Cost estimates were prepared for the purpose of alternative comparison and were based on information currently known about the study area. The cost estimates include capital costs, annual operation and maintenance costs, and present worth cost. The present worth cost for these alternatives was calculated for the expected duration of the remedy at a 7% discount rate.

The individual cost estimates for the remedial alternatives are included in Tables 6 through 8.

3.1.8. Community Acceptance

Community acceptance will be addressed during the public comment period prior to the Record of Decision (ROD).

3.2. Comparative Analysis of Alternatives

In the comparative analysis of alternatives, the performance of each alternative relative to the others was evaluated for each criterion. As discussed in the following subsections, each alternative satisfies the threshold criteria by providing protection to human health and the environment and by complying with the identified SCGs; therefore, each active alternative is eligible for selection as the final remedy.

3.2.1. Overall Protection of Human Health and the Environment

With respect to protection of human health, each alternative, except for Alternative 1, would provide equal protectiveness for ground water and soil potential impacts through institutional controls. Alternatives 2, 3 and 4 would also be protective of human health for impacts due to soil exposure, through capping or soil excavation and disposal.

Alternative 4 would provide more protection of the environment with respect to COC contaminated ground water through treatment of onsite and offsite ground water. Alternatives 1, 2 and 3 would rely on natural attenuation for protection of the environment for ground water. Control of source contamination afforded in Alternatives 2, 3 and 4 would result in a better prognosis for natural attenuation than under Alternative 1, where no source control would be provided.

3.2.2. Compliance with Standards, Criteria and Guidance

As summarized in Table 1, chemical-specific SCGs were identified for ground water and soil. Alternatives 1, 2 and 3 would address ground water SCGs through ground water use control and rely upon natural attenuation to meet SCGs. Alternative 4 could achieve SCGs for ground water through ground water extraction and natural attenuation. Control of source contamination afforded in Alternatives 2, 3 and 4 would result in a better prognosis for natural attenuation than under Alternative 1, where no source control would be provided.

Attainment of soil SCGs onsite would be anticipated following implementation of Alternatives 3 and 4. Alternative 1 would not meet soil SCGs. For Alternative 2, soil SCGs would not be attained, but risks would be addressed through containment.

Action specific SCGs would be met for Alternatives 2, 3 and 4. No action specific SCGs were identified for Alternative 1. No location specific SCGs have been identified for the alternatives.

3.2.3. Long-Term Effectiveness and Permanence

Alternatives 2, 3 and 4 would provide for long term effectiveness and permanence through adequate and reliable controls of potential impacts from ground water and soil. The magnitude of residual risk would be less for Alternatives 3 and 4. Alternative 1 does not provide adequate and reliable control of potential impacts from ground water and soil.

3.2.4. Reduction of Toxicity, Mobility, or Volume through Treatment

In Alternative 2, soil capping would reduce the mobility of COCs. For Alternatives 3 and 4, excavation and offsite disposal of soil would reduce the toxicity, mobility and volume of contaminated soil onsite. Alternative 1 does not provide reduction in toxicity, mobility or volume of contaminated soil.

Extraction and treatment of ground water, included in Alternative 4, would reduce the mobility, toxicity and volume of affected ground water at the Site. Natural attenuation of ground water, included in Alternatives 1, 2 and 3, would reduce toxicity of COCs in ground water. Treatment of ground water and natural attenuation are considered irreversible.

3.2.5. Short Term Effectiveness

Alternative 1 could be implemented immediately. Alternative 2, 3 and 4 would require approximately 1 to 2 years to construct and site soil RAOs would be achieved at the completion of the remedy. Engineering controls would be implemented during construction of the alternatives that would be adequately protective of the community and the environment.

It is anticipated that Alternative 4 would require 1 to 5 years to attain SCGs in ground water. It is also anticipated that natural attenuation of ground water, once the source has been removed (Alternative 3), would also require 1 to 5 years to achieve SCGs in ground water, based upon the natural ground water flow rate. For Alternatives 1 and 2, which do not include source removal, natural attenuation of ground water may require greater than 30 years to achieve SCGs in ground water.

3.2.6. Implementability

Each alternative would be implementable. The technologies that were considered would be reliable technologies. Each alternative would allow for additional remedial actions to be implemented if necessary, and would be readily monitored for effectiveness of the remedy.

3.2.7. Cost

Detailed cost estimates for Alternatives 1 through 4 are included as Tables 6 through 9.

Alternative 1, the no further action alternative, would be the least cost alternative with an estimated present worth of $0.

Alternative 2, the soil capping with ground water monitoring alternative, is the second most expensive alternative with an estimated present worth of approximately $821,000.

Alternative 3, the soil excavation and offsite disposal with ground water monitoring alternative, is the second least expensive alternative with an estimated present worth of approximately $445,000.

Alternative 4, the soil excavation and offsite disposal with ground water extraction and treatment alternative, is the most expensive alternative with an estimated present worth of approximately $3,623,000.

3.2.8. Community Acceptance

Community acceptance will be addressed during the preferred alternative public comment period prior to the ROD.

4. Conclusions and Recommendations

Alternative 3 is the recommended alternative. Alternative 3 would be expected to achieve the remedial objectives and would provide similar attainment of SCGs as the other alternatives at a lower cost. Remedial objectives would be achieved under Alternative 3 through the following remedy components:

- Excavation of source material
- Environmental Easement
- Site Management Plan

As documented in Section 3.2, Alternative 3 would achieve the two threshold criteria (protectiveness of human health and the environment and attainment of SCGs (based on ground water monitoring to evaluate achievement)), thus meeting the requirements of the NCP. Alternative 3 was selected over the remaining alternatives also attaining the two threshold criteria by a comparison to the primary balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost). Alternative 3 would provide a similar degree of long-term effectiveness and permanence and would be as implementable as Alternatives 2 and 4, at a lower cost.

5. References

Federal Register. 1990. *National Oil and Hazardous Substances Pollution Contingency Plan*. 40 CFR 300. March 8, 1990.

NYSDEC. 1990. *Technical and Administrative Guidance Memorandum (TAGM) for the Selection of Remedial Actions at Inactive Hazardous Waste Sites*. May 1990.

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NYSDEC. 1998. *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. Division of Water Technical and Operational Guidance Series (TOGS 1.1.1)*

NYSDEC. 2002. Draft DER-10*, Technical Guidance for Site Investigation and Remediation. Division of Environmental Remediation.* December 25, 2002.

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NYSDEC. 2006. Draft DER-15, Presumptive/Proven Remedial Technologies. November 11, 2006.

O'Brien & Gere Engineers, Inc. 2004. Final Project Management Work Plan (PMWP)

O'Brien & Gere Engineers, Inc. 2006. *Remedial Investigation Report.*

USEPA. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final*. Washington D.C., October 1988.

Table 1. *Evaluation of potential SCGs*

Medium/Location/ Action	Citation	Requirements	Comments	Potential SCG	Alternative
Potential chemical-specific SCGs					
Ground water	NYSDEC TOGS 1.1.1 - Class GA Ground Water Criteria	Fresh ground waters of the state must attain Class GA standards if intended for potable use. There are no specific standards for other ground water classifications.	Potentially applicable to site ground water.	Yes	1, 2, 3 and 4
Surface water	NYSDEC TOGS 1.1.1 - Class C Surface Water Criteria	Outlines surface water quality standards and guidance values for Class C surface waters.	Potentially applicable to surface water at Moreau Landifll.	Yes	1, 2, 3 and 4
Soil	6 NYCRR 375-6 - Restricted Use Soil Cleanup Objectives - Residential	Provides recommended soil cleanup objectives.	Potentially applicable to site soil.	Yes	1, 2, 3 and 4
Potential location-specific SCGs					
No potential location-specific SCGs were identified.	Not Applicable.	Not Applicable	Not Applicable	No	Not Applicable.
Potential action-specific SCGs					
General excavation	6 NYCRR 257-3 - Air Quality Standards	Provide limitations for generation of constituents including particulate matter.	Not applicable or relevant and appropriate because dust emissions would not be from a point source. May be useful for consideration during dust generating activities such as earth moving, grading and excavation of soil.	Yes	3 and 4
	40 CFR 50.1 through 50.12 - National Ambient Air Quality Standards.	Provides air quality standards for pollutants considered harmful to public health and the environment. The six principle pollutants include carbon monoxide, lead, nitrogen dioxide, particulates, ozone, and sulfur oxides.	Potentially applicable, as it relates to particulates, during dust generating activities such as earth moving, grading, and excavation of soil.	Yes	3 and 4
Removal and treatment actions	6 NYCRR 373 - Hazardous waste management facilities	Provides requirements for managing hazardous wastes.	Potentially applicable if hazardous waste is present in/removed from the NEGC Site. May also be applicable for treatment of ground water.	Yes	2, 3 and 4
Land disposal	6 NYCRR 376 - Land disposal restrictions	Provides treatment standards to be met prior to land disposal of hazardous wastes.	Potentially applicable for alternatives that include off site disposal.	Yes	2, 3 and 4
Discharge to surface water	6 NYCRR Parts 750 - 758 - SPDES	Provides concentration limits and monitoring requirements for discharges to waters of the State.	Potentially applicable for surface discharge of treated ground water	Yes	4
Construction	29 CFR Part 1910 - Occupational Safety and Health Standards - Hazardous Waste Operations and Emergency Response	Remedial activities must be in accordance with applicable OSHA requirements.	Applicable for construction and monitoring phase of remediation.	Yes	2, 3 and 4
	29 CFR Part 1926 - Safety and Health Regulations for Construction	Remedial construction activities must be in accordance with applicable OSHA requirements.	Applicable for construction phase of remediation.	Yes	2, 3 and 4
Transportation	6 NYCRR 364 - Waste Transporter Permits	Hazardous waste transport must be conducted by a hauler permitted under 6 NYCRR 364.	Potentially applicable.	Yes	3 and 4
	6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities	Substantive hazardous waste generator and transportation requirements must be met when hazardous waste is generated for disposal. Generator requirements include obtaining an EPA Identification Number and manifesting hazardous waste for disposal.	Potentially applicable.	Yes	3 and 4
	49 CFR 172-174 and 177-179 - Department of Transportation Regulations	Hazardous waste transport to offsite disposal facilities must be conducted in accordance with applicable DOT requirements	Potentially applicable.	Yes	3 and 4
Generation of air emissions	NYS TAGM 4031 - Dust Suppressing and Particle Monitoring at Inactive Hazardous Waste Disposal Sites	Provides limitations on dust emissions.	Potentially applicable.	Yes	2, 3 and 4

Table 1. *Evaluation of potential SCGs*

Medium/Location/ Action	Citation	Requirements	Comments	Potential SCG	Alternative
Construction storm water management	NYSDEC General permit for storm water discharges associated with construction activities. Pursuant to Article 17 Titles 7 and 8 and Article 70 of the Environmental Conservation Law.	The regulation prohibits discharge of materials other than storm water and all discharges that contain a hazardous substance in excess of reportable quantities established by 40 CFR 117.3 or 40 CFR 302.4. The following items would be required: development and implementation of a storm water pollution prevention plan; development and implementation of a monitoring program; all records must be retained for a period of at least 3 years after construction is complete	Potentially applicable for construction activities.	Yes	2, 3 & 4

Table 2. *Screening of remedial technologies and process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
Soil				
NO ACTION	None	None	No action.	Required for consideration by NCP (40 CFP Part 300.430).
INSTITUTIONAL ACTIONS	Access restrictions	Environmental easement	Land use restrictions for site.	Potentially applicable.
		Fencing	Installation of fencing surrounding area(s) of contamination.	Potentially applicable.
CONTAINMENT ACTIONS	Capping	Vegetated soil cover	Vegetated soil layer covering area(s) of contamination. Stabilizes soil and limits the spread of contaminants.	Potentially applicable for soils with metal contamination, however, not considered because infiltration is not minimized.
		Low-permeability cover	Soil layer used in conjunction with low permeability and protective layers to minimize infiltration.	Potentially applicable.
IN SITU TREATMENT ACTIONS	Chemical	Soil Flushing	Soil flushing is used to mobilize metals by leaching contaminants from the soil so that they can be extracted without excavating the contaminated materials.	Not applicable due to limited field application of the technology for site COCs, and potential difficulties related to site specific considerations including depths of contaminants in soil and ground water.
		Electrokinetics	A series of electrodes would be placed in a contaminant area to which a low voltage direct charge would be applied. Contaminant desorption and subsurface migration would occur and contaminants would be concentrated in a processing solution, which would then be extracted and treated.	Technology is more applicable for low permeable and saturated soil.

Table 2. *Screening of remedial technologies and process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
IN SITU TREATMENT ACTIONS (cont'd)	Chemical	Geochemical Fixation	Contaminated ground water is extracted and treated *ex situ*, followed by reinjection of the ground water (dosed with reductant) into the aquifer. The reductant would reduce the Cr^{+6} remaining in the interstitial water and the reduced chromium would geochemically fix onto the aquifer solids.	Not applicable for vadose zone soil treatment.
	Biological	Phytoremediation	Phytoremediation uses plants to remediate contaminated soil by taking advantage of the plants' natural ability to take-up, accumulate and/or degrade inorganic constituents.	Not applicable due to depths of soil contamination.
	Physical	Solidification/ Stabilization	Solidification involves the formation of a solidified matrix that physically binds the contaminated material. Stabilization utilizes a chemical reaction to convert the contaminant to a less mobile form. Solidification and stabilization involve mixing treatment agents with the contaminated soil yielding a crystalline, glassy or polymeric framework around the contaminants. Mobile trenching/mixing units allow for this technology to be implemented *in situ*.	Potentially applicable
		Vitrification	High temperature treatment of the contaminated area that would result in the formation of vitreous material. An array of electrodes would be inserted into the contaminated region and electric current would be passed through the soil.	Not applicable due to extent and depths of soil contamination

Table 2. *Screening of remedial technologies and process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
EX SITU TREATMENT ACTIONS	Physical	Solidification/ Stabilization	Solidification involves the formation of a solidified matrix that physically binds the contaminated material. Stabilization utilizes a chemical reaction to convert the contaminant to a less mobile form. Solidification and stabilization involve mixing treatment agents with the contaminated soil yielding a crystalline, glassy or polymeric framework around the contaminants.	Potentially applicable
REMOVAL ACTIONS	Excavation	Excavation	Use of construction equipment, such as backhoes or bulldozers to remove site soils.	Potentially applicable
DISPOSAL ACTIONS	Land disposal	Off-site commercial landfill	Off-site disposal of soil.	Potentially applicable
Ground water				
NO ACTION	None	Natural attenuation	In-place reduction of inorganic constituents in ground water over the long-term by biotic and abiotic attenuation processes.	Required for consideration by NCP. Potentially applicable.
INSTITUTIONAL ACTIONS	Site Management Plan	Ground water monitoring	Periodic sampling and analysis of ground water on-site and off-site to detect changes in constituent concentrations in ground water.	Potentially applicable.
	Access restrictions	Environmental easement	Restrictions would preclude the use of ground water at, and adjacent to, the site as potable water without proper treatment.	Potentially applicable.

Table 2. *Screening of remedial technologies and process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
CONTAINMENT ACTIONS	Vertical barrier	Slurry wall	Soil or cement-bentonite slurry wall placed around the area of contamination to contain ground water.	Not applicable. Applicable for shallow ground water plumes.
		Sheet piles	Sheet piles installed around the area of contamination to contain ground water.	Not applicable. Applicable for shallow ground water plumes.
	Ground water control	Ground water extraction wells	Removal of ground water by pumping for hydraulic containment at site. Potentially followed by *ex situ* treatment.	Potentially applicable.
		Recovery trench	Removal of ground water by pumping from recovery trenches for hydraulic containment or mass removal.	Not applicable. Applicable for shallow ground water plumes.
COLLECTION ACTIONS	Ground water extraction	Recovery Wells	Removal of ground water by pumping from recovery wells for mass removal.	Potentially applicable.
IN SITU TREATMENT ACTIONS	Chemical	Treatment wall	Construction of an iron wall or carbon wall to treat ground water as it flows through the treatment zone.	While technology could be used to reduce Cr^{+6}, it is not applicable due to the depth of ground water which would require interception.
EX SITU TREATMENT ACTIONS	Chemical	Precipitation	pH adjustment of ground water to separate organic/inorganic contaminants from ground water.	Potentially applicable.
		Ion exchange	Contaminants, particularly heavy metals, would be removed by passing ground water through a resin media that exchanges sorbed ions for dissolved contaminants. The exchange resin would be regenerated by back-flushing with a regeneration solution.	Potentially applicable.

Table 2. *Screening of remedial technologies and process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
DISCHARGE ACTIONS	Treated water discharge	Discharge to Surface water (Storm sewer)	Discharge of extracted and/or treated ground water to the storm sewer pursuant to a SPDES permit.	Potentially applicable.
		Discharge to ground water	Re-injection of extracted and treated ground water back to the sub-surface.	Potentially applicable, however, not considered further given other site discharge options.
		Discharge to POTW	Discharge of extracted and treated ground water to sanitary sewers.	Potentially applicable.

Table 3. *Evaluation of process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	EFFECTIVENESS	IMPLEMENTABILITY	COST
Soil					
NO ACTION	None	Natural attenuation*	Relies on long-term biotic and abiotic degradation. Effectiveness is not certain.	Readily implementable.	No capital No O&M
INSTITUTIONAL ACTIONS	Access restrictions	Environmental easement*	Effectively minimizes access to the Site.	Readily implementable.	Low capital No O&M
		Fencing*	Effectively minimizes access to the Site.	Readily implementable.	Low capital Low O&M
CONTAINMENT ACTIONS	Capping	Low-permeability cover*	Effectively minimizes human and ecological contact with impacted soil.	Readily implementable.	High capital Low O&M
IN SITU TREATMENT ACTION	Physical	Solidification/Stabilization	Effectively minimizes leachability of contaminants.	Readily implementable.	High capital Low O&M
EX SITU TREATMENT ACTION	Physical	Solidification/Stabilization	Effectively minimizes leachability of contaminants.	Readily implementable.	High capital Low O&M
REMOVAL ACTIONS	Excavation	Excavation*	Effectively removes impacted soil and fill material.	Readily implementable for unsaturated soil.	High capital No O&M
DISPOSAL ACTIONS	Land disposal	Off-site commercial landfill*	Effective method of disposal. Minimizes constituent migration.	Readily implementable.	High capital No O&M
Ground water					
NO ACTION	None	Natural attenuation*	Relies on long-term biological and abiotic degradation. Effectiveness is not certain.	Readily implementable.	No capital No O&M

Table 3. *Evaluation of process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	EFFECTIVENESS	IMPLEMENTABILITY	COST
INSTITUTIONAL ACTIONS	Site Management Plan	Ground water monitoring*	Effective for monitoring changes in organics and metals over time. Useful for evaluating remedy effectiveness.	Readily implementable.	Low capital Low O&M
	Access restrictions	Environmental easement*	Effectively minimizes potable water use of ground water.	Readily implementable.	Low capital No O&M
CONTAINMENT ACTIONS	Groundwater Control	Groundwater extraction wells*	Effectively controls migration of contaminated groundwater from site.	Readily implementable.	Low capital Medium O&M
COLLECTION ACTIONS	Ground water extraction	Recovery wells*	Effectively removes contaminated ground water.	Readily implementable.	Low capital Medium O&M
EX SITU TREATMENT ACTIONS	Chemical	Precipitation*	Effective for treatment of inorganics.	Readily implementable.	Medium capital Medium O&M
		Ion exchange*	Effective for treatment of inorganics.	Readily implementable.	Medium capital High O&M
DISCHARGE ACTIONS	Treated Discharge	Discharge to Surface Water (Storm sewer)*	Effective discharge option.	Readily implementable.	Medium capital LowO&M
		Discharge to POTW	Effective discharge option.	Readily implementable.	Medium capital High O&M

* Denotes representative process option.

Table 3. *Evaluation of process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	EFFECTIVENESS	IMPLEMENTABILITY	COST
Soil					
NO ACTION	None	Natural attenuation*	Relies on long-term biotic and abiotic degradation. Effectiveness is not certain.	Readily implementable.	No capital No O&M
INSTITUTIONAL ACTIONS	Access restrictions	Environmental easement*	Effectively minimizes access to the Site.	Readily implementable.	Low capital No O&M
		Fencing*	Effectively minimizes access to the Site.	Readily implementable.	Low capital Low O&M
CONTAINMENT ACTIONS	Capping	Low-permeability cover*	Effectively minimizes human and ecological contact with impacted soil.	Readily implementable.	High capital Low O&M
IN SITU TREATMENT ACTION	Physical	Solidification/Stabilization	Effectively minimizes leachability of contaminants.	Readily implementable.	High capital Low O&M
EX SITU TREATMENT ACTION	Physical	Solidification/Stabilization	Effectively minimizes leachability of contaminants.	Readily implementable.	High capital Low O&M
REMOVAL ACTIONS	Excavation	Excavation*	Effectively removes impacted soil and fill material.	Readily implementable for unsaturated soil.	High capital No O&M
DISPOSAL ACTIONS	Land disposal	Off-site commercial landfill*	Effective method of disposal. Minimizes constituent migration.	Readily implementable.	High capital No O&M
Ground water					
NO ACTION	None	Natural attenuation*	Relies on long-term biological and abiotic degradation. Effectiveness is not certain.	Readily implementable.	No capital No O&M

Table 3. *Evaluation of process options*

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	EFFECTIVENESS	IMPLEMENTABILITY	COST
INSTITUTIONAL ACTIONS	Site Management Plan	Ground water monitoring*	Effective for monitoring changes in organics and metals over time. Useful for evaluating remedy effectiveness.	Readily implementable.	Low capital Low O&M
	Access restrictions	Environmental easement*	Effectively minimizes potable water use of ground water.	Readily implementable.	Low capital No O&M
CONTAINMENT ACTIONS	Groundwater Control	Groundwater extraction wells*	Effectively controls migration of contaminated groundwater from site.	Readily implementable.	Low capital Medium O&M
COLLECTION ACTIONS	Ground water extraction	Recovery wells*	Effectively removes contaminated ground water.	Readily implementable.	Low capital Medium O&M
EX SITU TREATMENT ACTIONS	Chemical	Precipitation*	Effective for treatment of inorganics.	Readily implementable.	Medium capital Medium O&M
		Ion exchange*	Effective for treatment of inorganics.	Readily implementable.	Medium capital High O&M
DISCHARGE ACTIONS	Treated Discharge	Discharge to Surface Water (Storm sewer)*	Effective discharge option.	Readily implementable.	Medium capital LowO&M
		Discharge to POTW	Effective discharge option.	Readily implementable.	Medium capital High O&M

* Denotes representative process option.

Table 4. *Components of remedial alternatives*

General Response Actions	Remedial technology - process option	1	2	3	4
Institutional actions	Environmental easements	X	X	X	X
	Site Management Plan	X	X	X	X
Containment actions	Low permeability cover		X		
Removal actions	Source material excavation			X	X
	Ground water recovery wells				X
Disposal actions	Off-site land disposal of source material (permitted facility)			X	X
	Discharge of treated ground water to surface water (storm sewer)				X
Treatment actions	*Ex situ* precipitation				X
	Ex situ ion exchange				X
	Monitored natural attenuation (MNA)	X	X	X	

Alternative 1	No action
Alternative 2	Capping, an environmental easement and a Site Management Plan
Alternative 3	Source material excavation with offsite disposal, an environmental easment and a Site Management Plan
Alternative 4	Source material excavation with offsite disposal; ground water extraction, treatment and discharge; an environmental easement and a Site Management Plan

Table 5. Detailed analysis of alternatives

Criterion	Alternative 1: No further action	Alternative 2: Capping, an environmental easement and a Site Management Plan	Alternative 3: Source material excavation with offsite disposal, an environmental easement and a Site Managemnt Plan	Alternative 4: Source material excavation with offsite disposal; ground water extraction, treatment and discharge; an environmental easement and a Site Managemnt Plan
Overall protection of human health and the environment				
Overall protection of human health	Exposure pathways to groundwater are incomplete. However, exposure pathways to soil are complete. This alternative would not be protective of human health.	Exposure pathways to groundwater are incomplete. Future use of ground water would be restricted through environmental easements. Protection of human health relative to soil would be provided through capping and environmental easements.	Exposure pathways to groundwater are incomplete. Future use of ground water would be restricted through environmental easements. Protection of human health relative to soil would be provided through the removal of source area soil from the site.	Exposure pathways to groundwater are incomplete. Protection of human health for future use of ground water would be provided through groundwater extraction and treatment. Protection of human health related to soil would be provided through the removal of source area soil from the site.
Overall protection of the environment	This alternative would rely on natural attenuation for protection of the environment.	Protection of the environment would be provided through capping, which would reduce infiltration through the source area. Relies on natural attenuation of ground water for protection of the environment.	Protection of the environment would be provided through removal of source area soil. Relies on natural attenuation of ground water for protection of the environment.	Protection of environment would be provided through removal of source area soil and ground water extraction and treatment.
Compliance with standards, criteria, and guidance (SCGs)				
Compliance with chemical-specific SCGs	This alternative would not attain soil chemical specific SCGs. Relies on natural attenuation to achieve ground water SCGs.	Soil SCGs would be addressed through capping. Alternative would rely on natural attenuation to achieve ground water SCGs. Ground water monitoring is included to evaluate attainment of ground water SCGs.	Attainment of soil SCGs would be provided through removal of source area soil. Alternative would rely on natural attenuation to achieve ground water SCGs. Ground water monitoring is included to evaluate attainment of ground water SCGs.	Attainment of soil SCGs would be provided through removal of source area soil. Attainment of NYS Class GA ground water standards would be provided through extraction/treatment of ground water. Ground water monitoring is included to evaluate attainment of ground water SCGs.
Compliance with location-specific SCGs	No potential location specific SCGs were identified.	No potential location specific SCGs were identified.	No potential location specific SCGs were identified.	No potential location specific SCGs were identified.

Table 5. Detailed analysis of alternatives

Criterion	Alternative 1: **No further action**	Alternative 2: **Capping, an environmental easement and a Site Management Plan**	Alternative 3: **Source material excavation with offsite disposal, an environmental easement and a Site Managemnt Plan**	Alternative 4: **Source material excavation with offsite disposal; ground water extraction, treatment and discharge; an environmental easement and a Site Managemnt Plan**
Compliance with action-specific SCGs	No actions awould be part of this alternative.	Construction activities would be conducted consistent with air quality standards and requirements for construction within a flood plain. Site construction activities would be conducted in accordance with OSHA safety requirements.	Excavation activities would be conducted consistent with air quality standards. Offsite disposal of excavation material would be conducted in accordance with transportation and disposal requirements. Construction activities would be conducted in accordance with OSHA safety requirements.	Excavation activities would be conducted consistent with air quality standards. Site construction activities would be conducted in accordance with OSHA safety requirements. Treated water from the ground water treatment system would be discharged in accordance with SPDES requirements.
Long-term effectiveness and permanence				
Magnitude of residual risk	Impacted media would remain onsite. No reduction of risk associated with source area soil. Minimal risk of exposure to ground water and soil through use controls.	Minimal risk of exposure to ground water through use controls. Minimal potential residual risk of exposure to soil despite being left onsite.	Removal of source area soil would eliminate risk of exposure. Minimal potential residual risk of exposure to ground water through use controls.	Removal of source area soil would eliminate risk of exposure. Minimal potential residual risk of exposure to ground water through treatment and use controls.
Adequacy and reliability of controls	Ground water monitoring would be an adequate and reliable method for detecting changing concentrations of COCs. environmental easements would provide adequate control of future ground water and soil exposure.	Covering soil would provide adequate and reliable control over exposure to contaminated soil. Ground water monitoring would be an adequate and reliable method for detecting changing concentrations of COCs. Ground water use restrictions would provide adequate control of future ground water exposure.	Removal of source area soil and ground water use restrictions would provide adequate and reliable control of exposures.	Removal of source area soil and ground water treatment and use restrictions would provide adequate and reliable control of exposures.
Reduction of toxicity, mobility, or volume through treatment				
Treatment process used and materials treated	No active treatment processes or removal would be used in this alternative. Natural attenuation would be used for ground water.	No active treatment processes are used in this alternative. Natural attenuation would be used for ground water.	Excavation and offsite disposal would address contaminants in source area soil and material. Natural attenuation would be used for ground water.	Excavation and offsite disposal would address contaminants in source area soil and material. *Ex situ* chemical precipitation would be used to treat ground water.

Table 5. Detailed analysis of alternatives

Criterion	**Alternative 1: No further action**	**Alternative 2: Capping, an environmental easement and a Site Management Plan**	**Alternative 3: Source material excavation with offsite disposal, an environmental easement and a Site Managemnt Plan**	**Alternative 4: Source material excavation with offsite disposal; ground water extraction, treatment and discharge; an environmental easement and a Site Managemnt Plan**
Amount of hazardous material destroyed or treated	No active treatment processes or removal would be used in this alternative. Natural attenuation would be used for ground water.	Approximately 0.5 acres of soil would be isolated by installation of a soil cover.	Approximately 500 cubic yards of soil would be removed.	Approximately 500 cubic yards of soil would be removed. Approximately 40 million gallons of ground water would be treated per year.
Degree of expected reduction in toxicity, mobility, or volume	No active treatment processes or removal would be used in this alternative. Natural attenuation would provide reduction in concentration of COCs in ground water. Long term reduction of COCs in ground water is not known.	Covering soil would reduce potential for mobility of contaminants to migrate to ground water. Natural attenuation would provide reduction in concentration of COCs in ground water.	Approximately 500 cubic yards of fill material would be removed, thereby reducing mobility and toxicity. Natural attenuation would provide reduction in concentration of COCs in ground water.	Approximately 500 cubic yards of fill material would be removed and approximately 40 million gallons of ground water would be treated per year, thereby reducing mobility and toxicity.
Degree to which treatment is irreversible	Natural attenuation of ground water is irreversible.	Natural attenuation of ground water is irreversible.	Removal of soil is irreversible. Natural attenuation of ground water is irreversible.	Removal of soil is irreversible. Treatment of ground water is irreversible.
Type and quantity of residuals remaining after treatment	No active treatment processes or removal would be used in this alternative.	Approximately 500 cubic yards of contaminated soil would remain onsite, but under a cap. COCs would remain in ground water.	No residuals would remain after soil removal. COCs would remain in ground water.	No residuals would remain after soil removal. COCs could remain in ground water downgradient of the treatment zone.
Short-term effectiveness				
Protection of community during remedial actions	No remedial actions would be considered under this alternative.	Dust would be controlled during installation of soil cover.	Dust would be controlled during excavation and removal of soil.	Dust would be controlled during excavation and removal of soil.
Protection of workers during remedial actions	No remedial actions would be considered under this alternative.	Proper health and safety measures would be established and implemented during remedial activities.	Proper health and safety measures would be established and implemented during remedial activities.	Proper health and safety measures would be established and implemented during remedial activities.

Table 5. Detailed analysis of alternatives

Criterion	Alternative 1: No further action	Alternative 2: Capping, an environmental easement and a Site Management Plan	Alternative 3: Source material excavation with offsite disposal, an environmental easement and a Site Managemnt Plan	Alternative 4: Source material excavation with offsite disposal; ground water extraction, treatment and discharge; an environmental easement and a Site Managemnt Plan
Environmental impacts	There would be no environmental impacts expected as a result of implementation of this alternative.	Dust and surface runoff controls would be instituted to minimize impacts to the environment during implementation of this alternative.	Dust and surface runoff controls would be instituted to minimize impacts to the environment during implementation of this alternative.	Dust and surface runoff controls would be instituted to minimize impacts to the environment during implementation of this alternative. This action will require the discharge of approximately 110,000 gallons per day of treated ground water to surface waters.
Time until remedial action objectives (RAOs) are achieved	Natural attenuation under this alternative would not be anticipated to achieve NYS Class GA standards in ground water in the foreseeable future, due to the presence of a continuing source of COCs.	RAOs associated with exposure to soil would be met upon completion of a cover. Natural attenuation under this alternative would not be anticipated to achieve NYS Class GA standards in ground water in the foreseeable future.	RAOs associated with soil would be met upon completion of excavation. With source removal, natural attenuation under this alternative would be anticipated to achieve NYS Class GA standards in ground water in approximately 1 to 5 years.	RAOs associated with soil would be met upon completion of excavation. With source removal and ground water treatment, RAOs associated with Site ground water are estimated to be achieved in approximately 1 to 5 years.
Implementability				
Ability to construct and operate the technology	There would be no technologies to be constructed in this alternative.	Installation of a soil cover option is readily constructable.	Removal of soil is readily implementable.	Removal of soil is readily implementable. Installation and operation of ground water extraction wells and chemical precipitation equipment is readily constructable and operable.
Reliability of technology	There would be no technologies to be implemented in this alternative.	A soil cover is a reliable technology for isolation of impacted soils and for reduction of surface water infiltration. A low-permeability cover provides reliablility for minimizing infiltration and subsequent potential for contaminant migration. Environmental easements are a reliable means for restricting land and ground water use.	Removal of soil is reliable. Environmental easements are a reliable means for restricting land and ground water use.	Removal of soil is reliable. Chemical precipitation is a reliable technology to remove COC concentrations in ground water. Environmental easements are a reliable means for restricting land and ground water use.
Ease of undertaking additional remedial actions, if necessary	Additional remedial actions, if necessary, would be readily implementable.	Additional remedial actions, if necessary, would be readily implementable.	Additional remedial actions, if necessary, would be readily implementable.	Additional remedial actions, if necessary, would be readily implementable.

Table 5. Detailed analysis of alternatives

Criterion	Alternative 1: No further action	Alternative 2: Capping, an environmental easement and a Site Management Plan	Alternative 3: Source material excavation with offsite disposal, an environmental easement and a Site Managemnt Plan	Alternative 4: Source material excavation with offsite disposal; ground water extraction, treatment and discharge; an environmental easement and a Site Managemnt Plan
Ability to monitor effectiveness of remedy	There would be no remedy for this alternative.	Effectiveness of remedy would be monitored by cover inspection and ground water monitoring.	Effectiveness of remedy would be monitored through confirmation sampling and ground water monitoring.	Effectiveness of remedy would be monitored through confirmation soil sampling and treatment system and ground water monitoring.
Coordination with other agencies and property owners	Coordination with local authorities would not be necessary for this alternative.	Coordination with local authorities would be necessary to implement use and access restrictions.	Coordination with local authorities would be necessary to implement use and access restrictions.	Coordination with local authorities would be necessary to implement use and access restrictions and SPDES discharge requirements.
Availability of off-site treatment storage and disposal services and capacities	None required.	None required.	Offsite disposal facilities for material generated by removal of soil are available.	Offsite disposal facilities for material generated by removal of soil are available.
Availability of necessary equipment, specialists, and materials	Readily available.	Readily available.	Readily available.	Readily available.
Costs				
Capital cost	$0	$240,000	$290,000	$2,258,000
Present worth of operation and maintenance cost	$0	$581,000	$155,000	$1,365,000
Approximate total net present worth cost	$0	$821,000	$445,000	$3,623,000

Table 6
Northeastern Gravure Cylinder Service Site
NYSDEC Inactive Hazardous Waste Site #546029

Alternative #2
Soil Capping
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Direct Capital Costs					
1) Mobilization					
Contractor Bond	LS	1	$1,000	$1,000	
Equipment and Site Facilities	LS	1	$25,000	$25,000	
				SUBTOTAL:	**$26,000**
2) Site Preparation					
General Site Preparation	LS	1	$5,000	$5,000	
Erosion and Sediment Control					
Silt Fence	LF	1,000	$1	$1,000	
				SUBTOTAL:	**$6,000**
3) Low Permeability Cover					
Soil Bedding Material (6-inch depth)	CY	445	$15	$6,675	
40 mil LLDPE (Impermeable layer)	SF	28,800	$0.55	$15,840	
Tri-Planar Geonet	SF	28,800	$0.75	$21,600	
Barrier Protection Layer (24-inch depth)	CY	1,800	$15	$27,000	
Topsoil	CY	445	$25	$11,125	
Seeding/Mulch	SF	28,800	$0.50	$14,400	
				SUBTOTAL:	**$96,640**
4) Other Costs					
Environmental Easements	LS	3	$5,000	$15,000	
Air monitoring	LS	1	$2,500	$2,500	
Dust Control Plan	LS	1	$2,500	$2,500	
Stormwater Pollution Prevention Plan	LS	1	$5,000	$5,000	
Site Survey	LS	1	$6,000	$6,000	
				SUBTOTAL:	**$31,000**
				TOTAL DIRECT CAPITAL COST:	**$159,640**

Table 6
Northeastern Gravure Cylinder Service Site
NYSDEC Inactive Hazardous Waste Site #546029

Alternative #2
Soil Capping
COST ESTIMATE

Indirect Capital Costs

Low perm cover					
Contingency (30% Direct Capital Costs)		1	$47,892.00	$47,892	$47,892
Engineering (15% of Direct Capital Costs)		1	$23,946.00	$23,946	$23,946
Legal Fees (5% Direct Capital Costs)		1	$7,982.00	$7,982	$7,982
				TOTAL INDIRECT CAPITAL COST:	**$79,820**
				TOTAL CAPITAL COST:	**$240,000**

Annual Operation & Maintenance Costs

Insurance (1% Direct Capital Cost)	LS	1	$2,400	$2,400
Reserve Fund (1% Direct Capital Cost)	LS	1	$2,400	$2,400
Site Inspection	DAYS	4	$1,000	$4,000
Site Maintenance	LS	1	$12,000	$12,000
Periodic Review (Annual Cost)	LS	1	$1,000	$1,000
Ground Water Monitoring	LS	1	$25,000	$25,000
			SUBTOTAL (soil cover):	**$46,800**

APPROX. PRESENT WORTH* OF ANNUAL O&M: **$581,000**
*30 yr, I=7%

APPROXIMATE TOTAL PRESENT WORTH COST (SOIL COVER): $821,000

Assumptions:
Three deed restrictions: Gravure property and properties immediately north of Gravure property.
Site inspections to be performed quarterly.
Ground water monitoring quarterly for the 18 existing monitoring wells for Method ILM04.0 (metals analysis) with 4 QA/QC samples.

Table 7
Northeastern Gravure Cylinder Service Site
NYSDEC Inactive Hazardous Waste Site #546029

Alternative #3
Soil Excavation, Sampling and Offsite Disposal
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Direct Capital Costs					
1) Pre-Design Delineation Soil Sampling					
Labor	LS	1	$15,750	$15,750	
Field Equipment/Supplies	LS	1	$3,750	$3,750	
Subcontractors	LS	1	$13,000	$13,000	
				SUBTOTAL:	**$32,500**
2) UST and Soil Removal/Disposal					
Mobilization/Demobilization	LS	1	$10,000	$10,000	
Excavation	CY	500	$70	$35,000	
UST Removal	LS	1	$10,000	$10,000	
Backfill	CY	500	$25	$12,500	
Analytical - Confirmation sampling	EA	40	$40	$1,600	
Topsoil/Seeding	LS	1	$25,000	$25,000	
Non-hazardous Waste Disposal	TON	740	$65	$48,100	
Hazardous Waste Disposal	TON	10	$230	$2,300	
Concrete/Sludge Disposal	LS	1	$6,500	$6,500	
				SUBTOTAL:	**$151,000**
3) Other Costs					
Environmental Easement	LS	3	$5,000	$15,000	
Air monitoring	LS	1	$2,560	$2,560	
Health and Safety Plan	LS	1	$5,000	$5,000	
Dust Control Plan	LS	1	$2,500	$2,500	
Site Survey (Delineation Sampling and Final)	LS	1	$5,000	$5,000	
				SUBTOTAL:	**$30,060**
				TOTAL DIRECT CAPITAL COST:	**$213,560**

Table 7
Northeastern Gravure Cylinder Service Site
NYSDEC Inactive Hazardous Waste Site #546029

Alternative #3
Soil Excavation, Sampling and Offsite Disposal
COST ESTIMATE

Indirect Capital Costs					
Contingency (30% Direct Capital Costs)		1	$64,068	$64,068	
Engineering (15% of Direct Capital Costs)		1	$3,203	$3,203	
Legal Fees (5% Direct Capital Costs)		1	$10,678	$10,678	
			TOTAL INDIRECT CAPITAL COSTS:		**$77,949**
			TOTAL CAPITAL COSTS:		**$290,000**
Annual Operation & Maintenance Costs					
Site Inspection	DAYS	4	$1,000	$4,000	
Site Maintenance	LS	1	$2,000	$2,000	
Periodic Review (Annual Cost)	LS	1	$1,000	$1,000	
Ground Water Monitoring	LS	1	$25,000	$25,000	
Insurance (1% Direct Capital Cost)	LS	1	$2,900	$2,900	
Reserve Fund (1% Direct Capital Cost)	LS	1	$2,900	$2,900	
			SUBTOTAL:		**$37,800**
			PRESENT WORTH* OF ANNUAL O&M: *5 yr, I=7%		**$155,000**
			APPROXIMATE TOTAL PRESENT WORTH COST:		**$445,000**

Assumptions:

Max soil removal volume = 750 tons (500 cu yds); soil excavated up to 8 ft deep
Confirmation sampling from excavated soil for 30 environmental samples for CLP Method ILM04.0 with 8 QA/QC samples
Concrete disposal - $12/TON, Sludge disposal - $22/TON
Three deed restrictions: Gravure property and property immediately north of Gravure property.
Site inspections to be performed quarterly
Ground water monitoring quarterly for the 18 existing monitoring wells for Method ILM04.0 (metals analysis) with 4 QA/QC samples.

Table 8
Northeastern Gravure Cylinder Service Site
NYSDEC Inactive Hazardous Waste Site #546029

Alternative #4
Soil Excavation/Disposal and Ground Water Extraction/Treatment
COST ESTIMATE

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	
Direct Capital Costs					
1) Soil/UST excavation and disposal	**LS**	**1**	$213,560	$213,560	
				SUBTOTAL:	**$213,560**
2) Ground water extraction system	LS	1	$66,800	$66,800	
				SUBTOTAL:	**$66,800**
3) Ground water treatment system					
Treatability study	LS	1	$25,000	$25,000	
Pumping Systems	LS	1	$40,000	$40,000	
Filtration Systems	LS	1	$145,000	$145,000	
Tankage	LS	1	$170,000	$170,000	
Agitators	LS	1	$55,000	$55,000	
Solids Handling	LS	1	$180,000	$180,000	
Chemical Feed Systems	LS	1	$32,000	$32,000	
Treatment Building	LS	1	$100,000	$100,000	
Electrical, piping and controls (25% of equipment)	LS	1	$155,500	$155,500	
Installation (50% of equipment)	LS	1	$311,000	$311,000	
				SUBTOTAL:	**$1,213,500**
4) Other direct costs					
Site access agreement	LS	1	$10,000	$10,000	
SPDES Discharge Permit	LS	1	$10,000	$10,000	
				SUBTOTAL:	**$10,000**
5) Contractor Bond (1% of Capital Costs)	EA	1	$150,400	$150,400	
				SUBTOTAL:	**$150,400**
				TOTAL DIRECT CAPITAL COST:	**$1,654,260**

Table 8
Northeastern Gravure Cylinder Service Site
NYSDEC Inactive Hazardous Waste Site #546029

Alternative #4
Soil Excavation/Disposal and Ground Water Extraction/Treatment
COST ESTIMATE

Indirect Capital Costs

Contingency (30% Direct Capital Costs)		1	$496,278	$496,278	
Engineering (15% of Direct Capital Costs)		1	$24,814	$24,814	
Legal Fees (5% Direct Capital Costs)		1	$82,713	$82,713	
				TOTAL INDIRECT CAPITAL COSTS:	**$603,800**
				TOTAL CAPITAL COSTS:	**$2,258,000**

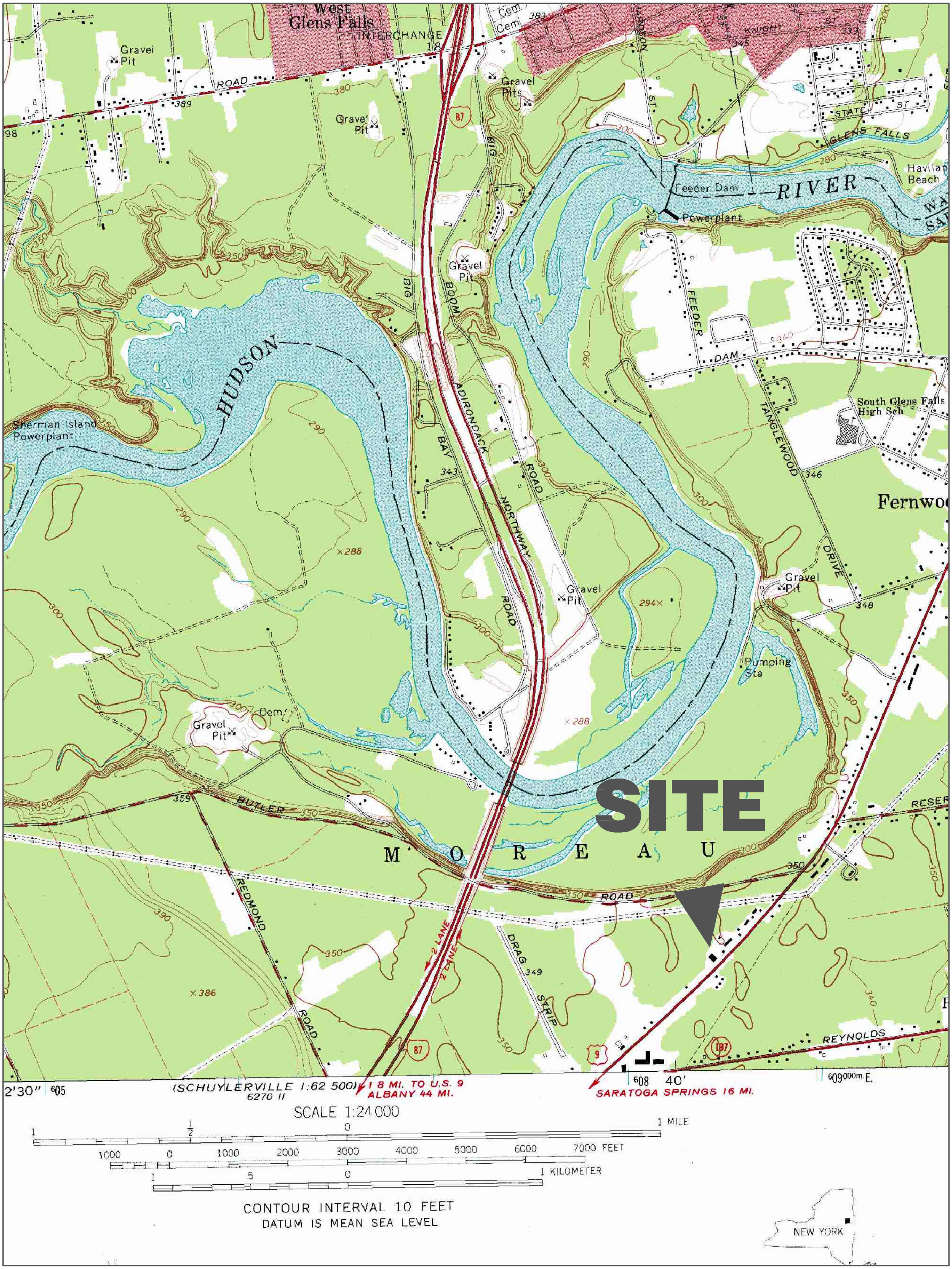
Annual Operation & Maintenance Costs

Ground Water Treatment System Operation and Maintenance	LS	1	$253,100	$253,100	
Ground Water Extraction System Operation and Maintenance	LS	1	$2,500	$2,500	
SPDES Discharge Monitoring	LS	1	$18,000	$18,000	
Ground Water Monitoring Program (quarterly)	EA	1	$25,000	$25,000	
Periodic Review (Annual Cost)	LS	1	$1,000	$1,000	
Insurance (1% Direct Capital Cost)	LS	1	$16,500	$16,500	
Reserve Fund (1% Direct Capital Cost)	LS	1	$16,500	$16,500	
				SUBTOTAL:	$333,000

PRESENT WORTH OF ANNUAL O&M AND PERIODIC COSTS: **$1,365,000**
*5 yr, I=7%

APPROXIMATE TOTAL PRESENT WORTH COST (rounded): $3,623,000

ASSUMPTIONS:
Site access agreement required for off-site ground water extraction wells
Ground water extraction and treatment rate at approximately 75 GPM.
Ground water extraction system consists of 3 off-site extraction wells, off-site access, and associated piping and utility hook-ups.
Ground water treatment building constructed on Gravure property
Three environmental easements: Gravure property and properties immediately north of Gravure property.
Site inspections to be performed quarterly.
Ground water monitoring quarterly for the 18 existing monitoring wells for Method ILM04.0 (metals analysis) with 4 QA/QC samples.



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SITE LOCATION MAP
Northeastern Gravure Cylinder Service
Moreau, New York

FILE NO. 35918.002

DATE February 2006

FIGURE 1

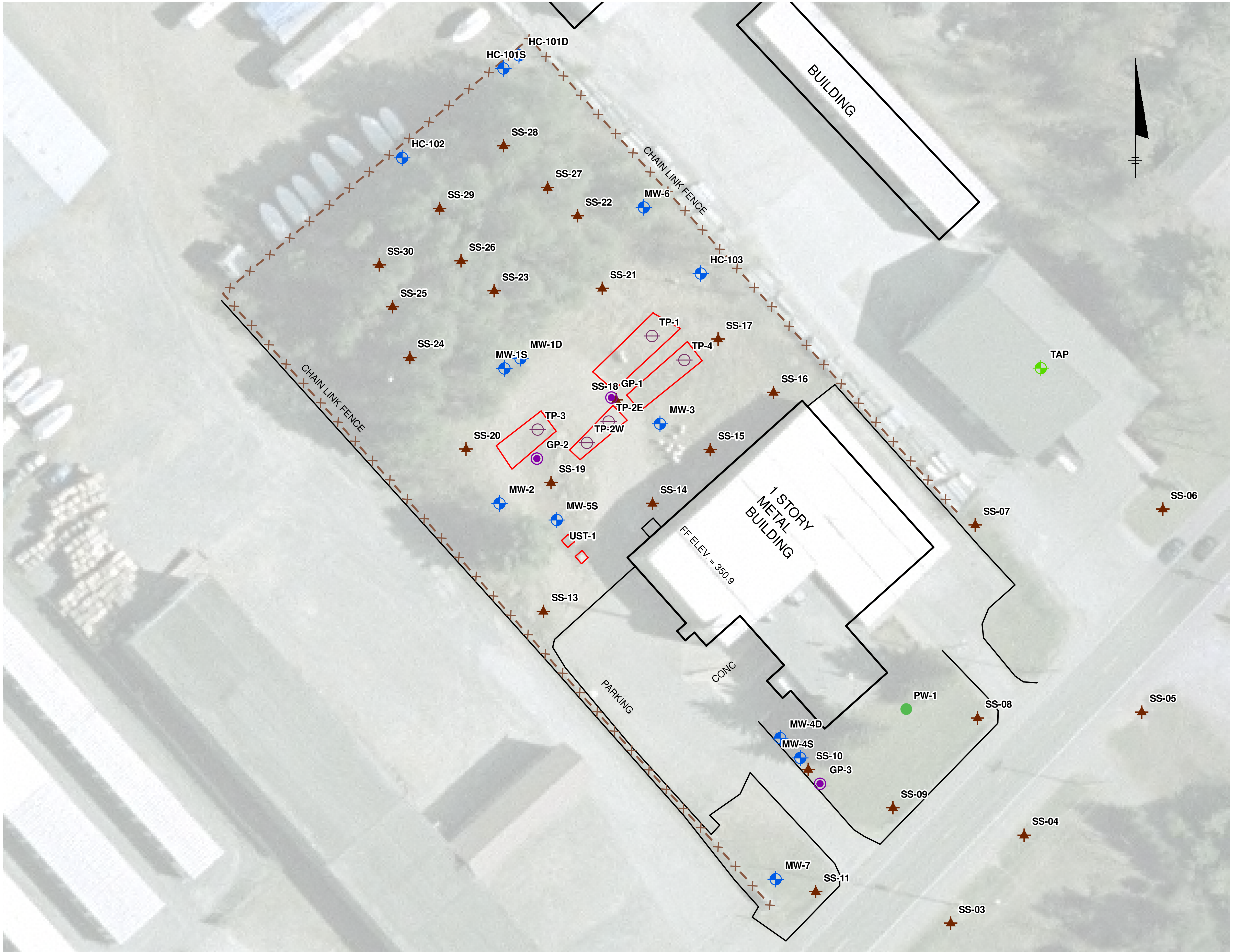

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FIGURE 2

Locations

- Surface Water
- Monitoring Well
- Surface Soil
- Tap Water
- Test Pit
- Geoprobe
- Pumping Well
- Chain Link Fence
- Test Pit Outlines
- Soil Excavation

NEW YORK STATE
DEPARTMENT OF
ENVIRONMENTAL
CONSERVATION

NORTHEASTERN GRAVURE CYLINDER SERVICE SITE

SAMPLE LOCATION MAP ON-SITE

1 inch equals 50 feet

50 25 0 50

Feet

April 10, 2007
survey base map_small_scale.mxd

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08/18/06

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FIGURE 3

Locations

- Surface Water
- Monitoring Well
- Surface Soil
- Tap Water
- Test Pit
- Geoprobe
- Pumping Well
- chain_link_fence
- Test Pit Outlines

NEW YORK STATE
DEPARTMENT OF
ENVIRONMENTAL
CONSERVATION

NORTHEASTERN GRAVURE CYLINDER SERVICE SITE

SAMPLE LOCATION MAP ON-SITE AND OFF-SITE

1 inch equals 180 feet

180 90 0 180

Feet

August 18, 2006
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08/18/06

FIGURE 4

Locations

- Surface Water
- Monitoring Well
- Surface Soil
- Tap Water
- Test Pit
- Geoprobe
- Pumping Well
- Chain Link Fence
- Test Pit Outlines
- Approximate Area of Soil Excavation

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

NORTHEASTERN GRAVURE CYLINDER SERVICE SITE

ALTERNATIVE 3 APPROXIMATE SOIL EXCAVATION AREA

1 inch equals 50 feet

50 25 0 50

Feet

January 3, 2007
survey base map_small_scale.mxd

O'BRIEN & GERE ENGINEERS, INC.